

# AUTOMOTIVE CENTER STACK PANEL WITH MOVING PANEL AND FOUR BAR HIDDEN LINKAGE

## DESCRIPTION

### Technical Field

**[Para 1]** The present invention relates generally to an automotive center stack panel with hidden display and more particularly to an automotive center stack panel with hidden display utilizing a moving panel and four bar hidden linkage.

### Background of the Invention

**[Para 2]** Automotive dash and control panels have been designed to incorporate an ever increasing array of controls and features. The increasing number of features has placed an increased value on instrument panel real estate. Increased density of controls and displays can hamper operator interaction. It is preferably for such interactions to be simplified so as to minimize distraction from primary vehicle operation. Under these desirable design constraints, automotive designers are now directed to incorporate navigation and other video displays into the already burdened center stack panels.

**[Para 3]** The video displays must be a reasonable dimension to facilitate easy visibility for a range of occupant sizes and proportions. The dimensions suitable for proper viewing can require a significant region of the center stack panel. Additionally, mounting a video display on the outer surface of the center stack panel often produces viewing angles that are poorly optimized for operation viewing. In this fashion, incorporation of video displays into the center stack or other vehicle control regions provides a significant challenge to automotive designers. It would be highly desirable to have a video display that provided a wide range of visibility for various occupants without resulting in an overly increased density of additional controls and features.

**[Para 4]** An additional challenge regarding video displays stems from the nature of their use within the automotive environment. Use for navigation and entertainment often only represents a small portion of vehicle operational time. During the remaining portions of time when the displays are not utilized they represent underutilized space

within the vehicle interior. They may also create an undesirable appearance or distraction when they are not in operation. It would, therefore, be highly desirable to have a video display that only usurped valuable panel space when in operation.

## Summary of the Invention

**[Para 5]** It is, therefore, an object of the present invention to provide an automotive center stack panel with hidden display. It is a further object of the present invention to provide such an automotive center stack panel which minimizes the impact of the display on control feature density.

**[Para 6]** An automotive center stack panel assembly is provided comprising an automotive instrument panel assembly having a recessed display chamber. A video display panel assembly is mounted within the recessed display chamber. A rear pivot link assembly is included having a rear first fixed pivot end rotatably mounted to the automotive instrument panel assembly and a rear second fixed pivot end. A forward pivot link assembly is included having a forward first fixed pivot end rotatably mounted to the automotive instrument panel assembly and a forward second pivot end. A control panel includes an upper control panel end and a lower control panel end and a control panel slot guide. The rear second fixed pivot end rotatably is mounted to the upper control panel end and the forward second pivot end slidably is mounted within said control panel slot guide. The rear pivot link assembly and the forward pivot link assembly allow the control panel to rotate such that the control panel is pivotable between a display hidden position and a display exposed position. The control panel covers the recessed display chamber when in the display hidden position.

**[Para 7]** Other objects and features of the present invention will become apparent when viewed in light of the detailed description of the preferred embodiment when taken in conjunction with the attached drawings and appended claims.

## Brief Description of the Drawings

**[Para 8]** FIGURE 1 is an illustration of an automotive center stack panel assembly in accordance with the present invention, the automotive center stack panel assembly illustrated in the display exposed position.

**[Para 9]** FIGURE 2 is an illustration of the automotive center stack panel assembly illustrated in Figure 1, the automotive center stack panel assembly illustrated in the display hidden position.

**[Para 10]** FIGURE 3 is a cross-sectional illustration of the automotive center stack panel assembly illustrated in Figure 2.

**[Para 11]** FIGURE 4 is a cross-sectional illustration of the automotive center stack panel assembly illustrated in Figure 1.

## Description of the Preferred Embodiment(s)

**[Para 12]** Referring now to Figure 1, which is an illustration of an automotive center stack panel assembly 10 in accordance with the present invention. The automotive center stack panel assembly 10 illustrated is intended to encompass a wide variety of instrument panel assemblies suitable for automotive applications. As such, the automotive center stack panel assembly 10 includes an automotive instrument panel assembly 12 having an instrument panel outer surface 14. Such instrument panel assemblies 12 are known outer finish elements within the automotive industry. The present invention, however, further includes a recessed display chamber 16 formed into the automotive instrument panel assembly 12. A video display panel assembly 18 is mounted at the rear of the recessed display chamber 16. This allows the video display view orientation 20 to be optimized for any occupants without regard to the contour of the instrument panel outer surface 14. It is contemplated that the video display panel assembly 18 may encompass a wide variety of applications, although a navigation system or audio system is preferred.

**[Para 13]** The present invention allows for selective use of the video display panel assembly 18 through the use of a control panel 22 pivotably mounted to the instrument panel assembly 12. Control panels 22 are known to provide access to a variety of controls and features within the automotive environment. The control panel 22 includes a plurality of control buttons 24 positioned on the control panel outer surface 26. The control panel 22 is pivotably movable between a display exposed position 28 and a display hidden position 30 (see Figure 2). In the display hidden position 30 the control panel 22 moves upward to completely cover the recessed display chamber 16. This provides a plurality of benefits. By covering the recessed display chamber 16, the control panel 22 prevents the video display panel assembly 18 from becoming a distraction or giving an unsightly appearance when not activated. Additionally, by moving upward into the display hidden position 30, the control panel 22 moves the plurality of control buttons 24 upwards where they may be more easily accessed by a vehicle operator. The control panel 22 preferably moves between the display hidden position 30 and the display exposed position 28 while the control outer surface 26 remains coincident with the instrument panel outer surface 24. This insures

a positive finish appearance in both positions while more effectively hiding the recessed display chamber 16 when in the display hidden position 28.

**[Para 14]** The present invention controls movement of the control panel 22 through a unique mechanical configuration illustrated in Figures 3 and 4. The present invention includes a rear pivot link assembly 32 connecting the control panel 22 to the instrument panel assembly 12. The rear pivot link assembly 32 may comprise a pair of rear pivot links formed on the sides of the control panel 22. The rear pivot link assembly 32 includes a rear first fixed pivot end 34 rotatably mounted to the instrument panel assembly 12. The rear pivot link assembly 32 further includes a rear second fixed pivot end 36 rotatably mounted to a control panel upper region 38. The rear pivot link assembly 32 is rotatable between a vertical rear pivot stowed position 40 and a horizontal rear pivot deployed position 42. A linkage panel 44 may be mounted to the rear pivot link assembly 32 such that the linkage panel 44 forms a shelf 46 in the recessed display chamber 16 when the control panel 22 is in the display exposed position 28.

**[Para 15]** The present invention further contemplates the use of a forward pivot link assembly 48 positioned forward of said rear pivot link assembly 32. The forward pivot link assembly 48 includes a forward first fixed pivot end 50 rotatably mounted to the instrument panel assembly 12 and a forward second pivot end 52 slidably engaging the control panel 22. This is accomplished preferably by way of a control panel slot guide 54 formed in the side control panel surface 56. The forward second pivot end 52 is preferably slidably retained within this slot guide 54 such that it moves between a lower slot guide end 58 (when said control panel 22 is in the display hidden position 30) and an upper slot guide end 60 (when said control panel 22 is in the display exposed position 28). This allows rotation of the control panel 22 while maintaining the orientation of the control panel outer surface 26 relative to the instrument panel outer surface 14. The forward pivot link assembly 48 is thereby rotatable between a vertical forward pivot stowed position 61 and a horizontal forward pivot deployed position 63. An upper engagement element 62 may be utilized to frictionally engage the control panel 22 to retain it in the display hidden position 30 until an operator effectuates movement. Stopping of the control panel 22 in the display exposed position 28 may be accomplished by a combination of the forward second pivot end 52 reaching the upper slot guide end 60 and the rear pivot link assembly 32 coming to rest on the forward pivot link assembly 48.

**[Para 16]** An additional feature of the present invention is a flexible electronics cable 64 providing communication between the video display panel assembly 18 and the control panel 22. The flexible electronics cable 64 has a first cable end 66 in communication with the video display panel assembly 18 and a second cable end 68 in communication with the control panel 22. This allow the plurality of control buttons 24 to control the video display panel assembly 18 in either the display exposed position 28 or the display hidden position 30. Additionally, the use of the linkage panel 44

protects and hides from view the flexible electronics cable 64 when the control panel 22 is in the display exposed position 28. This provides a unique and effective mechanical connection between the control panel 22 and the video panel display assembly 18.

**[Para 17]** While particular embodiments of the invention have been shown and described, numerous variations and alternative embodiments will occur to those skilled in the art. Accordingly, it is intended that the invention be limited only in terms of the appended claims.